REMARKS

As to the 112 Rejection

Claims 12-26 were rejected under 35 U.S.C. §112, second paragraph, because it was unclear as to what total weight percentages the weight percentages were based on. Applicants has amended claim 12 to recite that the weight percentages are based on the thermoplastic polyurethane composition. That is the weight percentages recited are for the total composition which includes the weight of the polyurethane polymer and the additive. Basis for this amendment can be found on page 10, lines 10-13, of the specification as filed.

Independent claims 1, 31 and 42 were also amended in the same manner as Claim 12, since they had similar language regarding weight percents of the flame retardant additive.

The Examiner is respectfully requested to remove the 35 U.S.C. §112 rejection based on the amendments made to the claims.

As to the 102/103 Rejection

Claims 1-29 were rejected under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over EP Patent No. 0 389 768. This rejection is respectfully traversed and reconsideration is requested.

The present invention deals with solving the problem of making a flame retardant thermoplastic polyurethane (TPU) while retaining good tensile strength and molecular weight of the polymer in the finished article. Nitrogen containing flame retardants such as melamine cyanurate degrade the TPU polymer when the polymer is exposed to the heat of processing, such as extrusion into a wire and cable jacket. Some past approaches have been to use small amounts of melamine cyanurate together with other flame retardants such as phosphates. If one uses too little melamine cyanurate, the desired flame retardency is not achieved. Applicants have found a way to have the required level of melamine cyanurate for flame retardant and also retain the tensile properties (greater than 1500 psi) and the TPU molecular weight (greater than 70,000 Daltons) in the finished article. This is accomplished by using melamine cyanurate as the sole organic flame retardant.

The reference EP 0 389 768 teaches a blend of three classes of flame retardants, i.e., (A) one or more nitrogen containing phosphates; (B) one or more nitrogen containing organic

compounds; and (C) one or more metal hydroxides. Melamine cyanurate is mentioned as one possibility in class (B) above. There is no showing of melamine cyanurate as the sole organic flame retardant. The reference states at column 6, lines 4-10, that the smoke generation is at least 50% lower with the 3-way mixture of A+B+C, than a two-way mixture or single component flame retardant. This teaching points away from the present invention of using only melamine cyanurate at the recited level as the sole organic flame retardant.

While the EP reference mentions polyurethane polymers, the objective of the EP reference is to make a flame retarded polyurethane foam. Polyurethane foams, such as used in furniture padding, is a thermoset polyurethane, which is much different than the thermoplastic polyurethane used by Applicants in the current applications. All of Applicants' claims require a thermoplastic polyurethane. As can be seen from the Example in the reference, at column 5, lines 42-43, the product made is a polyurethane foam.

The EP reference also has no teaching about the required molecular weight and tensile strength of the polyurethane polymer as is required in Applicants' invention. Polyurethane foams, as made by the reference, typically have very low tensile strength because they are low density and do not have sufficient polymer to give high tensile strength and the foams will be very high molecular weight because they are thermoset polymers.

As to Claims 27-29

The reference (EP 0 389 768) cited in the rejection of claims 27-29 does not have any teaching to adding a small amount (0.05 to 2.0 mole percent based on the total moles of chain extender) of a crosslinking agent having a functionality greater than 2.0 to the TPU composition. Applicants have shown in the Examples that adding less than 1.0 mole percent of trimethylol propane crosslinking agent to replace an equivalent mole percent of the 1,4-butanediol chain extender results in the TPU maintaining a higher molecular weight after processing. The Examiner's attention is directed to Ether A (no crosslinking agent) used in Runs 5-10 compared to Ether B (with small amount of crosslinking agent) used in Runs 11-14, as shown in Table I on page 22 of the specification. The very small amount of crosslinking agent gives approximately a 30-40% improvement in molecular weight (compare Run 5 with Run 11 and Run 6 with Run 12 and Run 8 with Run 13). This is very unexpected and beneficial for retaining molecular weight

in a TPU polymer when using a flame retardant that will degrade the molecular weight of the TPU. This feature is not taught by the cited reference nor is it suggested. Therefore, the 35 U.S.C. §102 and 35 U.S.C. §103 rejection should not apply at all to these claims. The Examiner is respectfully requested to remove the 102 and 103 rejection.

As to Claims 30-55

Claims 30-55 were not specifically mentioned in the Office Action, other than them being shown as rejected on PTO-326. Claim 30 depends from claim 29 and Applicants would like to refer to the response above as to claim 29. Claims 31-41 deals with a wire and cable construction capable of passing both the requirements of UL-1581 section 1080 and UL-1581 section 1080 subject 758, section G tests. A TPU composition is used as the jacket which has a tensile strength greater than 2900 psi and a molecular weight greater than 100,000 Daltons as measured on the finished cable construction, that is after all heat processing. This result is very surprising in that the wire and cable construction has good flame retardency while also having good physical properties, even though a flame retardant was used which degrades the polymer.

Claims 42-53 deals with the process to make the wire and cable construction recited in claims 31-41.

Claims 54-55 deals with a TPU composition that has both a low LOI% and a low PRHR. This is very unexpected in that for most materials, the LOI% and PRHR are reciprocal. It was quite surprising to find that, for example, the composition used in Run 13 would give a low LOI% and a low PRHR. Run 13 used a TPU composition having 30.5 wt.% melamine cyanurate and less than 1 mole percent of trimethylol propane to replace an equivalent mole percent of chain extender (Ether B). This composition is recited in claims 27-30.

As to the Blount Reference

On page 3 of the Office Action, the Examiner refers to the Blount reference. Applicants are not sure which reference this is referring to, as no patent number was listed nor was a copy provided. Applicants have performed a search on Blount as the inventor and found a large number of patents. Based on the comments of the Examiner in the Office Action, it is believed that the Examiner is referring to U.S. Patent No. 6,492,444. Therefore, this response will be

directed to U.S. Patent No. 6,492,444. If the Examiner intended a different Blount reference, please inform the Applicants and they will respond to the correct Blount reference.

The Blount reference teaches an organic phosphorus-phosphorus oxyacid flame retardant for thermoplastic resins. Polyurethanes are listed at column 6, line 27, along with several other thermoplastics. Applicants invention does not use an organic phosphorus-phosphorus oxyacid flame retardant. The only organic flame retardant recited in Applicant's claims is melamine cyanurate, which is not an organic phosphorus compound. The Examiner states on page 3, third line from bottom, that "melamine phosphate is a clear variation contemplated within the realms of the disclosure". Even if melamine phosphate was a clear variation contemplated by the Blount reference, Applicants do not use melamine phosphate. The Blount reference does not have any teachings which would render Applicants' claims anticipated or obvious. It is respectfully requested that the rejection based on the Blount reference be removed.

Summary

The EP reference used to reject claims 1-29 uses a mixture of 3 flame retardants, one of which could be melamine cyanurate, and has no teachings as to maintaining molecular weight and tensile strength of a thermoplastic polyurethane. Applicants have shown unexpected results in that the compositions recited in Applicants' claims have a low LOI% while also having a low PRHR. This feature is not present when comparing a commercial flame retarded TPU having a melamine cyanurate/organic phosphate flame retardant system (Run 15). Only by using melamine cyanurate as the sole organic flame retardant was this unexpected result obtained. Also, the references do not have any teaching that a very small amount of crosslinking agent will allow the tensile and molecular weight of the TPU polymer to be retained at a higher level, as recited in Applicants claims 27-30. The references are also silent as to a wire and cable construction which can pass both of the UL tests as recited in claims 31-41.

The amended claims now comply with 35 U.S.C. §112 and are not anticipated by the EP reference or Blount reference, nor are they obvious in view of either the EP reference, the Blount reference nor a combination of the two references.

The Examiner is respectfully requested to remove the rejection and allow the amended claims.

Respectfully submitted,

Joe A. Powell

Joe A. Powell
Reg. No. 28,108

Noveon, Inc.
Legal Department
9911 Brecksville Road
Cleveland, Ohio 44141-3247
(216) 447-5716
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